

**Air Defense Artillery
Signal Operations Battalion
and
Signal Operations Company**

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Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

Preface

Purpose and Scope

This publication brings together the ADA communications requirements and how they will be fulfilled and maintained. This publication describes operations and training applications of a signal battalion's personnel in support of a theater Army air defense command. It does not cover routine and detailed maintenance tasks. These maintenance tasks are found within appropriate technical manuals. The organizational concept is based on Army of Excellence initiatives. In explaining how the signal battalion fights, this publication describes the C2 procedures, the operations of the staff, and the systems of combat service and support required for the operations.

User Information

The proponent of this publication is HQ TRADOC. The preparing agency is USASC&FG. Your comments and recommendations to this publication are encouraged. Submit changes for improving this publication on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and key them to pages and lines of text to which they apply. If DA Form 2028 is not available, a letter is acceptable. Provide reasons for your comments to ensure complete understanding and proper evaluation. Forward your comments to Commander, United States Army Signal Center and Fort Gordon, ATTN: ATZH-DTL, Fort Gordon, Georgia 30905-5070.

Chapter 1

Air Defense Artillery

1-1. General

a. ADA provides protective coverage over deploying corps, divisions, brigades, and battalions of the force it supports. ADA protects high value critical assets in the area of operations, such as airfields, key bridges, depots, or similar fixed assets. This coverage normally includes both SHORAD and HIMAD ADA weapons. SHORAD units may be found at echelons from division to EAC. They may be assigned or attached depending on the mission. The HIMAD units are assigned at corps and EAC levels with deployment capability throughout the area of operations.

b. ADA support of operations is based on AirLand battle doctrine. AirLand battle doctrine extends the battlefield in scope, depth, and time, and integrates conventional, electronic, chemical, and nuclear warfare.

(1) Doctrine to support the AirLand battle is based on securing and regaining the initiative to defeat threat forces. Operations are designed to throw the threat off balance with a powerful initial blow from an unexpected direction, followed by rapid exploitation to prevent recovery.

(2) Flexibility, combined arms cooperation, and integration of efforts are essential to battlefield success. ADA units will--

- Support operations that preserve and exploit the initiative.
- Attack the threat in depth with fire and maneuver.
- Maintain the agility that is necessary to shift forces and fires to threat weaknesses.
- Synchronize the myriad efforts to attain the commander's goal.

c. ADA will be involved in each of the three facets of the AirLand battle--deep, close, and rear area protection. ADA helps preserve our combat power by limiting the threat's ability to use reconnaissance aircraft, by protecting maneuver units and other critical assets in priorities established by the supported commander, and by denying the threat air superiority. Because of the limited number of available ADA resources, passive air defense measures are critical to mission accomplishment and force survivability.

d. ADA communications must support the AirLand battle elements of initiative, depth, agility, and synchronization. Equipment mobility and personal training must allow frequent moves, with little advanced notice. Diverse, survivable communications must be available to ensure ADA connectivity for deep, close, and rear area protection. Equipment must be designed,

deployed, and operated to deny success to threat ESM and ECM operations. This doctrine describes the role of the ADA Signal Operations Battalion and Company in future AirLand battle operations.

1-2. Threat to ADA Communications

a. ADA units use a number of systems for near real-time voice and data communications, including UHF multichannel radios, HF and VHF single-channel radios, and landlines. The threat developed formidable ESM, ECM, and targeting capabilities to destroy or disrupt ADA communications. ECM are directed at both multichannel and single-channel radio links. Through communications monitoring, the threat gathers intelligence from our unencrypted voice and data transmissions. Another ESM technique, radio DF, allows the threat to locate our emitters and to direct fire at communications nodes.

b. The operational success of threat ESM and ECM can be reduced by--

- Positioning emitters to minimize radiation toward the FLOT, threat jammers, and DF stations (behind hills to exploit terrain masking).
- Remoting emitters away from associated command centers to reduce targeting effects.
- Moving units frequently to reduce possibility of targeting.
- Using encryption devices for voice and data.
- Using the lowest transmission power which provides acceptable communications.

1-3. Mission

a. The US Army's ADA mission consists of the following:

- Ensuring all combined arms retain the freedom to maneuver.
- Protecting C2 intelligence by using the right force at the right time and place.
- Sustaining the battle from the Division level through the EAC.
- Killing enemy air the first time.

b. The role of ADA weapon systems is to accomplish the ADA mission within the capabilities of these systems. For example, SHORAD's role is to accomplish the ADA mission within the very-low-to-low-altitude boundary of the battlefield. Hawk's role is to accomplish the ADA mission within the low-to-medium-altitude boundaries of the battlefield while Patriot's role is to accomplish the ADA mission within the very-low-to-very-high-altitude boundaries.

- c. Specific ADA responsibilities are--
- To deny or limit threat aerial reconnaissance of our maneuver, combat support, and combat service support forces.
 - To engage and destroy or drive off threat aircraft before they can release their ordnance.
 - To deny threat aircraft the use of airspace over portions of the battlefield.
 - To provide target location information (range, azimuth, altitude) to helicopter and Air Force aircraft.
 - To provide early warning information of air attack/activity to the force being protected.

Chapter 2

Communications Systems Control and Coordination

2-1. General

The overall ADA commander needs a capable, responsive, and robust communications system. The system must have inherent redundancy for C2 of the tactical operations of subordinate combat units and elements. The commander provides ADA service support units with communications in order that they may effectively support his combat operations. A multichannel, multiaccess, multimeans, integrated network answers these requirements. This network extends from the theater rear boundary to the maneuver brigades of the combat divisions. The integrated network consists of a dedicated ADA signal battalion or ADA signal operations company and a common-user area communications network. Signal units of the echelon receiving communications install, operate, and maintain these systems. However, using units install and operate portions of the command system such as combat net radio command nets.

2-2. Command System

The backbone of the command system consists of high quality, multichannel radio links. HF and VHF combat net radios and user provided messenger service back up multichannel radio links. The command communications system interconnects the major command headquarters with respective subordinate command headquarters. This system may also furnish connection to an adjacent headquarters. These multichannel systems are provided for and operated by signal corps organizations that support the appropriate echelons. The dedicated ADA signal battalion or signal company provides multichannel communications only down to battalion level. At battalion and below, the multichannel systems are organic to the ADA units.

2-3. Area System

The area communications system is comprised of geographically dispersed area signal nodes. These nodes are normally located in regions of subscriber density concentrations. They are provided by signal units organic to the echelon which they support (theater army, corps, or divisional signal). The nodes locations provide area coverage and service the geographical distribution of subscribers. These nodes are interconnected by multichannel radio systems to form a grid type array which provides redundancy through the inherent alternate routing capability. Each node provides telecommunications center facilities and central office telephone service. Users may come to the telecommunications center for "over the counter" message service. Additionally, some nodes can provide for NRI stations. The nodes also provide extension (tributary) trunks to units whose mission or operational requirements demand entry into the area communications system. In practical usage, the command and area systems function in unison to provide the overall integrated communications network.

2-4. AADCOM Communications

a. An AADCOM or central ADA command and its subordinate units which support tactical forces must destroy attacking aircraft or must greatly reduce the effectiveness of the attack. To do this, the commander and staff need reliable and flexible communications facilities for command, control, administration, and intelligence operations. These facilities must provide for interchange of nonsecure and secure voice, teletypewriter, and digital data information. This interchange is not only within the AADCOM or central ADA command but also with the Air Force, supported Army units, and other headquarters and elements affected by ADA operations. The total purpose of this information interchange is control and coordination of air defense operations. The ADA communications network consists of an ADA command communications system, which when necessary, is separate from the area system. The ADA command communications system is integrated with the area system. When possible, they reduce dependence on vulnerable single system communications links and take advantage of the alternate routing power of the area grid systems. This includes connectivity with joint and combined Air Force and command facilities. The theater signal officer supports ADA connectivity including extension links to ADA designated headquarters and nodes. The ADA command system operates on a near real-time information transfer basis. Its most important function is to carry the digital data transmissions between weapon system processors at the HIMAD FDC and from the FDC to the individual fire units. High quality, highly reliable digital data circuits are essential to enable the ADA HIMAD weapon systems to function as an integrated system in fighting the air battle.

b. The corps ADA brigade has no automated FDCs and thus no requirement for dedicated command communications to its HIMAD battalion. The area system provides voice command communications. However, the AADCOM signal battalion will provide communications from the corps HIMAD battalion to the nearest automated brigade FDC/CRC or TAOC.

2-5. Multichannel Radio Communications

a. The ADA SIGOP battalion installs, operates, and maintains the ADA multichannel radio communications system. This dedicated multichannel command communications system extends from--

- The AADCOM headquarters to the assigned ADA brigades and laterally between brigades.
- Each ADA brigade to assigned HIMAD battalions.
- Each brigade to the appropriate Air Force CRC.
- The AADCOM to the ADSCOM.
- The AADCOM to the reconstitution point.
- The American Patriot battalion to the host nation Patriot battalion.

The HIMAD battalion, not the HIMAD signal battalion, provides command multichannel communications to assigned batteries (PCPs and ECSs).

b. The theater area communications system provides extension links to designated ADA headquarters and nodes as well as connectivity to Army, joint, and Allied headquarters.

c. The ADA multichannel radio communications network consists of high quality links that provide reliable digital data, teletypewriter, and voice communications circuits. These links are backed up in a voice and RATT mode by single-channel HF radio nets. Further voice capability is obtained through the area communications system and FM radio nets. There is no digital data backup capability other than the alternate routing power of the theater area grid system for the highly critical weapon system fire control circuit. The multichannel system is the primary means of ADA communications in HIMAD units. Within SHORAD units, HF and FM radios are the primary means of communications due to SHORAD's higher mobility aspects. This ADA network provides communications for the commanders and staff--

- To C2 their units.
- To meet the ADA weapon systems operational requirements to successfully fight the air battle.
- To communicate with lower, adjacent, higher, and supported unit headquarters.
- To coordinate air defense operations.
- To issue early warning orders for air attack.

d. This paragraph discusses the circuits required for mission support of ADA C2 functions and dedicated multichannel systems.

(1) The ADL is the principal ADA HIMAD weapons system C2 circuit. It is a secure duplex link that passes near real-time air battle data in digital form. This information is critical to HIMAD weapon system operations and must pass through the entire fire control structure from CRC to fire unit. The ADL circuit also extends from the ADA brigade C2 FDC to the corps Hawk battalion C2 FDC via multichannel system facilities when a corps Hawk battalion is fielded. This extension is necessary because the corps HIMAD battalion operates under engagement control of the nearest AADC with an automated FDC (TSQ-73). Backup is provided by user-owned and user-operated HF radios.

(2) The ICN voice circuit passes air defense intelligence information (primarily early warning) and targeting information when the data is unavailable on the ADL. Although it is a two-way voice circuit, it is normally used for one-way, higher to lower dissemination. The AADC/M multichannel system provides the primary ICN circuit with HF radios providing the backup. The HIMAD SIGOP battalion is responsible for the ICN circuit to battalion level; organic HIMAD battalion assets provide the ICN circuit between the battalion and the battery.

2-6. Radio Teletype

An HF RATT command net is established between the AADCOR headquarters and the brigades. The SIGOP company of the ADA SIGOP battalion provides and operates the NCS at the AADCOR headquarters. The SIGOP battalion provides additional HF RATT terminals at the AADCOR to participate in the theater command/operations net and the theater/intelligence net. The RATT nets described above provide secure RATT links and carry part of the normal traffic load. They also serve as a backup traffic means if the multichannel system is disrupted, or if it is being reestablished due to unit relocation.

2-7. Combat Net Radio HF Communications

The following ADA HF voice radio nets are used as backup if the multichannel system is disrupted or nonoperational during unit displacement.

a. The ICN circuit passes air defense intelligence information (primarily early warning) and targeting information when data is unavailable on the ADL. Although it is a two-way voice circuit, it is normally used for one-way, higher to lower dissemination.

b. The AADCOR HHB provides the personnel and equipment to operate the stations at the CRCs. There is normally one CRC servicing each corps area. AADCOR -headquarters does not participate in the net since it does not have an FDC facility. The net structure is CRC to brigade FDC to battalion FDC.

c. Each brigade provides the personnel and equipment to operate these stations from its brigade FDC. The other stations are located in the ADA HIMAD battalions and are provided by those battalions.

d. The AADCOR command/operations net carries normal command and operations traffic and connects the brigades with the AADCOR headquarters. The NCS is the AADCOR's G3 section.

e. The brigade liaison net is an HF net which supports the brigade liaison element. The brigade liaison element is comprised of two teams. One team locates with its brigades' respective CRC. The other team locates with the supported corps TOC in the facility commonly known as the CAME. The brigade's TOC is the NCS.

2-8. Net Radio Interface

NRI facilities are installed, operated, and maintained at the AADCOR by the brigade SIGOP company and at the ADA brigade command signal nodes by each SIGOP company. These facilities provide access to the ADA telephone system for personnel who are away from the CP and who have vehicular FM radio equipment. The FM radios may be interconnected on a push-to-talk basis through the NRI facility to the main switchboard. Then, they are connected to the desired subscriber. Additionally, various area signal nodes provide NRI facilities for user access to the area communications system.

2-9. Messenger Service

Messengers may deliver low precedence messages and bulky materials such as maps, charts, operation plans, administrative reports, or data files. Messengers may also deliver unencrypted classified messages when circumstances make messenger service faster. Each unit provides its own messengers.

2-10. Tactical Field Radio

During movement, or when multichannel radio circuits are unavailable, user organic tactical field radios provide the necessary communications within and between the ADA brigade and battalion headquarters, radio range permitting. The net's setup includes command, operations, administrative, logistical, and intelligence. Depending on level and need, nets may be combined (the operations and intelligence nets may become an operations/intelligence net). The net composition and designated participants vary among ADA units depending on the unit and its mission.

2-11. Communications Responsibilities

a. The AADCOP commander establishes an effective communications system so that elements of his command can carry out their assigned missions. He exercises control of the ADA SIGOP battalion through the AADCOP signal officer, who is also the ADA SIGOP battalion commander (dual-hat status).

b. The ADA SIGOP battalion commander is responsible for the installation, operation, and maintenance of the communications systems installed by the battalion. He also has staff responsibility for the proper functioning of the communications systems internal to ADA units. He ensures effective transfer of information traffic throughout the ADA communications network.

c. Each subordinate ADA commander establishes an effective communications system within his units. FM 24-1 covers tactical signal communications responsibilities common to all signal staff and unit signal officers.

d. The ADA SIGOP battalion HHC provides--

- The AADCOP headquarters with internal communications.
- A multichannel terminal to the ADSCOM.
- The AADCOP TAC CP to the reconstitution point.
- The multichannel system (both terminals) from each host nation Patriot battalion to the American Patriot battalion communications network.

e. The SIGOP companies provide the nonorganic ADA dedicated command communications system which supports the communications requirement for each of the EAC ADA brigades. This entails connection of brigades through a multichannel system, multinode configuration (with relays as necessary) to

connect to respective ADA battalions. This includes the appropriate RATT terminals and telecommunications center facilities at brigade level.

f. The communications platoon organic to each ADA battalion HHB provides communications to their subordinate batteries as well as internal communications facilities for the battalion headquarters. They install and operate multichannel systems, RATT stations, telecommunications centers, and patching facilities.

g. In the central ADA command, a separately organized SIGOP company furnishes the communications system support required of the brigade's mission. Its basic structure and responsibilities are similar to the battalion SIGOP company. Multichannel radio equipment and organic signal maintenance capability differ. Tropospheric scatter radio sets span the greater distances (up to 241 kilometers (150 miles) without using relays) between ADA task elements. Operations in this environment will be without adequate external DS/GS signal maintenance support until the normal support force arrives. As a result, internal resources are configured for a greater organic signal maintenance capability.

2-12. Communications Control

a. Communications control is the management of communications resources to satisfy requirements generated by the mission and tactical operations of the supported command. It involves planning, establishing, and operating the communications system for the supported command. The AADCOM signal staff officer/commander of the ADA SIGOP battalion discharges communications control responsibilities through his staff and through the signal battalion CSPE and CSCE. The CSPE and the CSCE are supervised by the ADA SIGOP battalion S3 and are located and operated at the AADCOM command signal node. Similarly, at ADA brigade level, a CSCE of the battalion SIGOP company operates at the brigade command signal node. The SIGOP company commander supervises this CSCE.

b. The CSPE and CSCE of the ADA SIGOP battalion and the CSCEs of the SIGOP companies follow standard communications control procedures. Control circuits are set up to give these elements direct telephone and teletypewriter communications with like facilities in the ADA communications system. Control circuits are usually referred to as orderwire or engineering circuits. These circuits provide direction for routing, rerouting, and emergency rearrangement of circuits in the system. They permit the collection and timely distribution of information relative to circuit control operations and other signal communications information concerning the ADA communications system. Complete and current signal communications records and reports are maintained as a reference on the status of all ADA communications system's components.

2-13. Communications Systems Integration

The ADA communications system interfaces with the Air Force/Marine Corps communications system at the CRC and the TAOC. The respective ADA SIGOP company installs and operates the links from the brigade to the CRC and to the TAOC.

b. ADA brigades located in areas afforded communications coverage by other area systems may be interfaced by signal units of the servicing area system. This provides redundant routing over multichannel systems as well as communications access to other units and headquarters not in the ADA community.

2-14. Communications Coordination

a. Operating ADA signal communications systems within an area signal node network requires that close signal coordination and liaison be maintained by the AADCOM signal officer/ADA SIGOP battalion commander with--

- The area system signal officers.
- The ADA unit signal officers.
- The host nation communications officers.
- The TCC and the CSCE.

b. When an ADA brigade operates independently, the ADA brigade signal officer then acts in the same capacity as the AADCOM signal officer. FM 24-1 covers coordination activities common to all signal officers and tactical signal communications.

c. In the area of AADCOM communications coordination, the commander of ADA SIGOP battalion usually has the AADCOM commander's authority to exercise operational control and coordination actions over the integrated, overall signal communications system of the AADCOM. Normally, the AADCOM signal officer/ADA SIGOP battalion commander provides technical staff supervision over the internal signal communications of the subordinate ADA units. He has a signal staff section to assist in discharging these signal responsibilities. The CSPE of the ADA SIGOP battalion issues signal directives, SSIs (formerly CESI), plans, and coordinating instructions. These are issued to the ADA brigade signal officers and their staffs. These personnel, in turn, forward them to assigned ADA battalions for implementation. Close coordination is needed between the Army ADA, the Air Force, and the Marines when conducting joint force operations to include other elements of air defense and air traffic control operations.

2-15. Electronic Warfare

All units deploying assets using the electromagnetic spectrum must consider friendly and threat electronic warfare capabilities. Maximum effort must be taken to reduce hostile use of the electromagnetic spectrum. Furthermore, effective deployment of an ADA communications system dictates that actions must be taken to ensure unobstructed use of friendly electromagnetic assets. FM 24-1 discusses electronic warfare components and measures to prevent hostile use and to enhance friendly use of the electromagnetic environment.

Chapter 3

Command and Control (C2)

3-1. General

This chapter describes the principles of ADA C2. It outlines the necessary processes, procedures, and capabilities required by counter-air forces to properly detect, acquire, identify, and kill potential counter-air threats; these processes form the core requirement for signal support.

3-2. Nature

a. The nature of ADA C2 supports the force commander's operation and decision making processes. It supports the processes to control and plan current and future operations. The ADA C2 system requires the ability to achieve maximum ADA predictive planning, to anticipate the intent of the threat act to disrupt the threat's plans, and to allow the commander to take advantage of opportunities.

b. ADA commanders can expect to fight the air battle over the full depth of the battlefield from the theater rear boundary to forward of the FLOT. The ADA C2 system must be flexible and must function in near real time over the full depth of the battlefield. Leaders must think quickly. The staff must be highly trained to execute the "sense-think-decide-act" cycle of C2 more quickly than the threat and to operate inside of the reaction time capability.

3-3. Principles

Three principles are fundamental to the C2 of ADA operations. These are centralized management with maximum decentralized authority to engage, air battle management, and management by exception.

a. Centralized management by a single air defense commander exercising overall control of the planning and conduct of counter-air operations ensures the coordination, integration, maximum effectiveness, and economy of total ADA assets. However, centralized management, with maximum decentralized authority to engage, ensures rapid and flexible response to the air threat.

b. The air battle management principle states the need for close coordination among diverse elements of ADA assets, and the need to integrate ADA operations with all other tactical operations, offensive and defensive.

c. Under the principle of management by exception, subordinate echelons are given maximum freedom of action; higher echelons monitor and intervene on a case-by-case basis where necessary to countermand or modify actions of subordinates.

3-4. ADA C2 Versus Ground C2

a. Under the umbrella concept of AirLand battle, C2 has different meanings for the air battle versus the land battle. Distances in the air battle are measured in minutes, even seconds. Distances in the land battle are measured in hours. The area of interest in the air battle considers a volume of airspace, with speed of the target critical, versus the two dimensions of primary interest on land. The airspace is occupied by army forces and by joint and allied air forces and encounters a wider range of ECM threats.

b. The air battle commander's area of interest may cross over land boundaries and may include much larger ranges than the land battle. As such, the air battle dictates farther reaching, greater ECM capable, information gathering systems, and rapid, modular, jam resistant, data distribution and voice communications systems. Due to the nature of air battle, the ADA C2 requires high-speed data distribution links, the capability to rapidly identify targets as friend or threat, and procedural rules that allow maximum decentralization of engagement authority.

3-5. Functions

The three primary functions of ADA C2 are force C2, operational C2, and targeting C2.

a. Force C2 includes those activities common to the command control of all ground forces. Some force C2 functions are--

- To analyze the area of operations.
- To provide administration and logistics support.
- To perform tactical operations.
- To provide operational communications.
- To perform ground self-defense.
- To support and sustain the force.

b. Operational C2 involves ADA airspace management combat operations and activities performed before and during the air battle. Operational C2 includes--

- Commanding and controlling Army airspace (A2C2).
- Observing/enforcing rules of engagement.
- Assigning and allocating ADA resources.
- Establishing system employment procedures and firing doctrine.
- Managing the joint and combined air battles.

c. Targeting C2 encompasses activities of ongoing or imminent air activity that are significant only in the presence of threat aerial targets. Information and data flow are required on a real-time basis. Some targeting C2 activities are--

- Detecting.
- Identifying.
- Assigning targets for engagement.
- Ordering engagement of hostile targets.
- Sending and executing fire control orders.
- Assessing results of engagements.

3-6. Operational Concept

a. ADA, in all types of fights, performs in an environment characterized by rapid movement, heavy electronic warfare, and intense, violent combat conditions. The C2 system must be reliable, swift, and survivable to effectively detect, acquire, identify, and kill threat targets. Sufficient planning prior to counter-air operations is required to establish priorities and procedures under which ADA assets may engage the right targets at the right time and place. Once these plans have been synchronized for the ground and air battle, the C2 system provides the ADA weapons platforms the appropriate information to kill the threat target. Counter-air forces include the spectrum of ADA weapons, other combined arms weapons used in a ground to air defense role, and joint service weapon systems. Specifically, the C2 system--

(1) Links the ADA forces through the ADA SIGOP battalion installed communications network. It also links the area telecommunications system to battlefield functional areas to receive timely command, control, intelligence target, and support information.

(2) Sends out near real-time air defense procedural information from the AADC to all counter-air weapon systems, organic, attached, or supporting the force.

(3) Provides rapid, flexible connectivity from higher to lower headquarters and laterally between units to permit exchange of mutually advantageous surveillance, identification, and control data, thus facilitating mass, mix, and integration and exploiting the mobility of ADA forces.

b. C2 is accomplished through communications facilities at all echelons from brigade through theater. The multichannel telecommunications system primarily passes force C2 information supplemented by tactical combat net radios.

c. ADA operational C2 is largely accomplished by procedural management, within the air defense rules and procedures set up by the AADC and to a limited extent, the corps and division commander.

d. Targeting C2 information is received from intelligence and ADA organic sensors in the theater, corps, and division areas. USAF E3A, USN E2C, and SIS all provide surveillance information. Early warning of airborne attack may be provided from a combination of HIMAD C2 systems and joint sensor arrays. This long-range early warning must be passed to the entire force over the early warning radio net. Engagement decisions are normally made at the individual ADA fire unit level based upon force C2, operational C2, and targeting C2 information made available through the various systems.

3-7. EAC ADA Brigade C2

a. The EAC brigade commander exercises full command of assigned forces because all ADA functions (to include targeting, force, and counter-air operations C2) are passed through his command level. The commander task-organizes and deploys forces to support the priorities of the commander exercising OPCOM/OPCON.

b. The EAC brigade commander's C2 requirements are--

- To integrate ADA operations with the theater commander's plan and concept.
- To maximize effectiveness of organic ADA weapons.
- To minimize interference between ADA, USAF, USMC, and other airspace users.
- To maintain an effective interface with the AADC.
- To coordinate ADA defense matters with adjacent and lower-echelon ADA and other counter-air assets in the theater area.

c. ADA HIMAD operational and targeting C2 functions are distributed by automatic data links through the AN/TSQ-73 system and Patriot ICC to fire units to achieve fast reaction times. Procedural rules developed at USAF levels are passed through the CRC to the EAC C2 system. The CRC also sends available targeting C2 and identification data through the EAC brigade (AN/TSQ-73) to the battalion C2 system. The EAC brigade C2 system also interfaces with the corps brigade C2 system to facilitate coordination of EAC ADA units located in the corps area.

Chapter 4

Signal Operations Battalion

4-1. General

a. The commander of the ADA SIGOP battalion is the battalion commander and is a special staff officer (signal officer) on the AADCOM commander's staff.

b. The ADA SIGOP battalion's mission is to provide the nonorganic dedicated command communications system which supports the EAC ADA C2 system. The communications system furnishes the transmission of real- and near real-time digital and voice information essential to the execution of air defense C2 functions. The assignment is organic to the AADCOM TOE 44601.

c. The ADA SIGOP battalion does not furnish the ADA battalions with internal communications, nor does it furnish communications between ADA battalions and their subordinate batteries. These communications are furnished by the communications section of the ADA battalions.

4-2. Capabilities and Limitations

a. The SIGOP battalion provides 24 hours a day--

- A multichannel radio nodal communications system which provides voice and data channels to link the AADCOM headquarters, EAC ADA brigades, battalions, CRC, ADSCOM, reconstitution points, and the American/host nation Patriot battalion interconnect.

- Signal nodes that support the AADCOM headquarters and terminal facilities at the ADSCOM and reconstitution point and CRC.

- Signal nodes that support each of the brigade headquarters (three nodes per brigade).

b. The ADA SIGOP battalion has specific capabilities when at TOE strength level 1 (AR 220-1). They include installing, operating, and maintaining a multichannel communications network to link the AADCOM, ADSCOM, AADCOM TAC CP, reconstitution point, 4 ADA brigades, 20 ADA battalions, and the American/host nation Patriot battalion. Figure 4-1 shows the AADCOM multichannel net.

c. Command telecommunications centers are provided for the AADCOM and the ADA brigades. Table 4-1 shows each telecommunications center facilities and services.

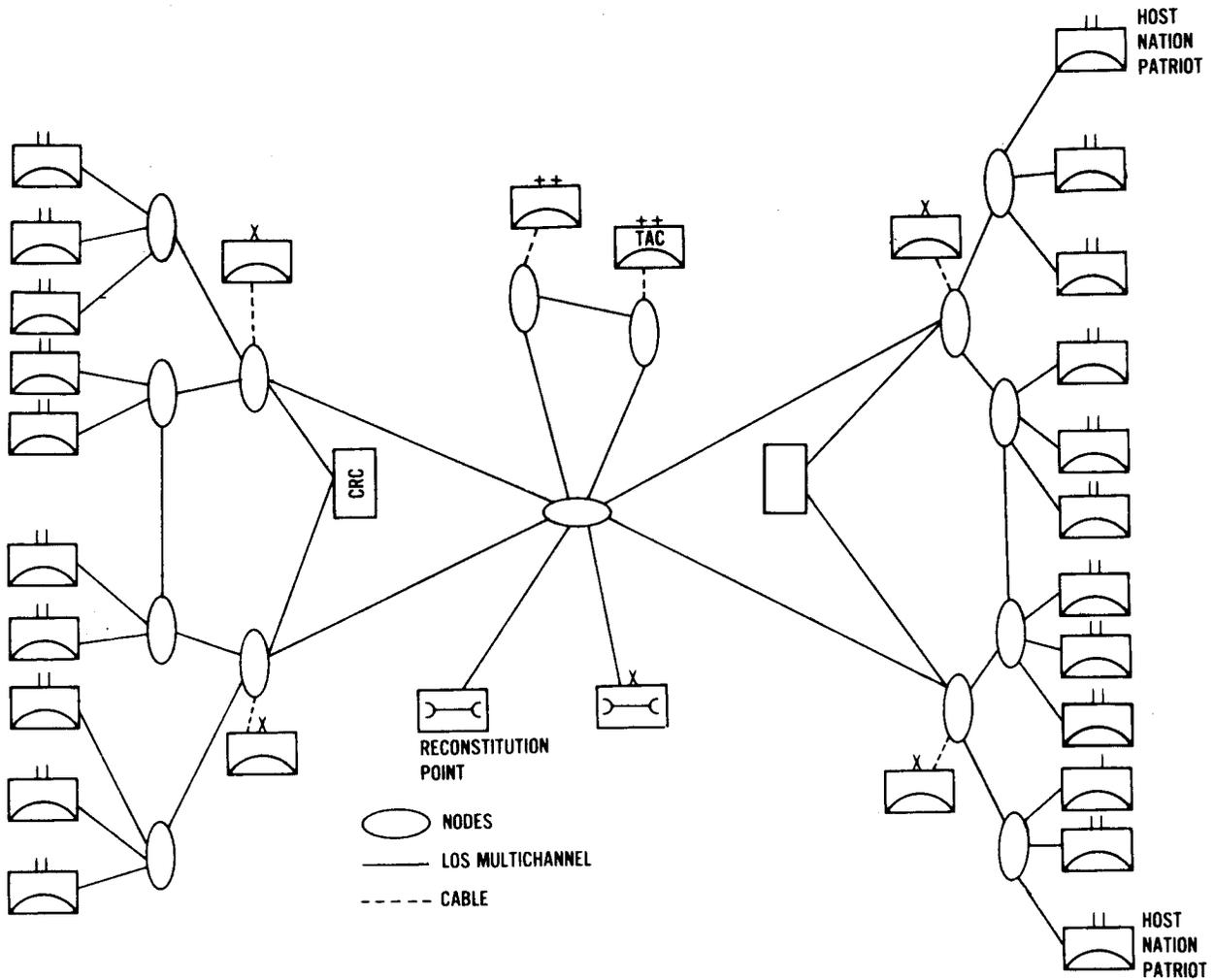


Figure 4-1. AADCOM multichannel net.

Table 4-1. Facilities and services.

FACILITIES	SERVICES
<p style="text-align: center;">Radio Telephone Teletypewriter</p>	<p style="text-align: center;">Message Center Communications COMSEC Facsimile</p>

- d. The ADA SIGOP battalion also--
- Provides the internal communications facilities for the AADCOM headquarters.
 - Installs, operates, and maintains multichannel radio links between the AADCOM and each subordinate ADA brigade; between ADA brigade and CRC; and between the ADA brigade and subordinate battalions.
 - Ties into and uses the theater common-user area system whenever possible.
 - Provides the RATT stations at AADCOM and brigades.
 - Handles frequency management for the entire AADCOM.
 - Provides management for all leased telephone lines used within the AADCOM.
 - Provides the interface between the American/host nation Patriot ADA communication (forward ADA belt).
 - Provides the dedicated fire direction C2 communications link between the corps HIMAD battalion to the nearest EAC brigade with an automated FDC (upon fielding of corps Hawk battalions).
- e. Operational capabilities are reduced to 90 percent and 80 percent, respectively, of the level 1 capability when the battalion is at TOE strength levels 2 and 3 (AR 190-13). Primarily, at levels 2 and 3, the number of multichannel radio repeaters is reduced. This unit is not adaptable to type B organization. The battalion depends on--
- Combat service support organizations for medical, dental, and finance services.
 - The Air Force for tactical airlift support.

- The theater signal command for radio frequency allocations.
- The theater transportation command for personnel and equipment movement.
- The theater/corps signal brigade for communications terminal facilities to enter the area communications systems.
- Theater/corps support command units for required additional DS/GS maintenance.

4-3. Training and Mobility

In addition to training in their basic skills, personnel receive further training under ARTEP 11-175. Battalion personnel train to engage in effective, coordinated defense of their respective unit's area or installation using--

- Rear area protection procedures.
- Operations in an internal defense environment.
- Defense against threat aircraft.
- Operations under NBC conditions.

4-4. Organization

The ADA SIGOP battalion is organized under TOE 11675. One ADA SIGOP battalion is assigned to the theater AADCOM. The HHC is organized under TOE 11676; the brigade SIGOP company is organized under TOE 11677. Figure 4-2 shows the battalion organization chart.

4-5. AADCOM Signal Staff Organization and Functions

a. The AADCOM TOE does not have an organic signal staff. Rather, the staff personnel and equipment for this section come from the signal battalion TOE. This is in consonance with the dual-hat role of the signal battalion commander as the AADCOM signal officer. The staff includes officers who are specifically detailed to assist the AADCOM commander. Although the commander actually commands the staff, the deputy or assistant directs and supervises it. Although each staff officer has specialized duties, there are five functions common to all staff officers. These five functions are--

- Providing information.
- Making appraisals.
- Making recommendations.
- Preparing plans and orders.
- Supervising the execution of plans and orders.

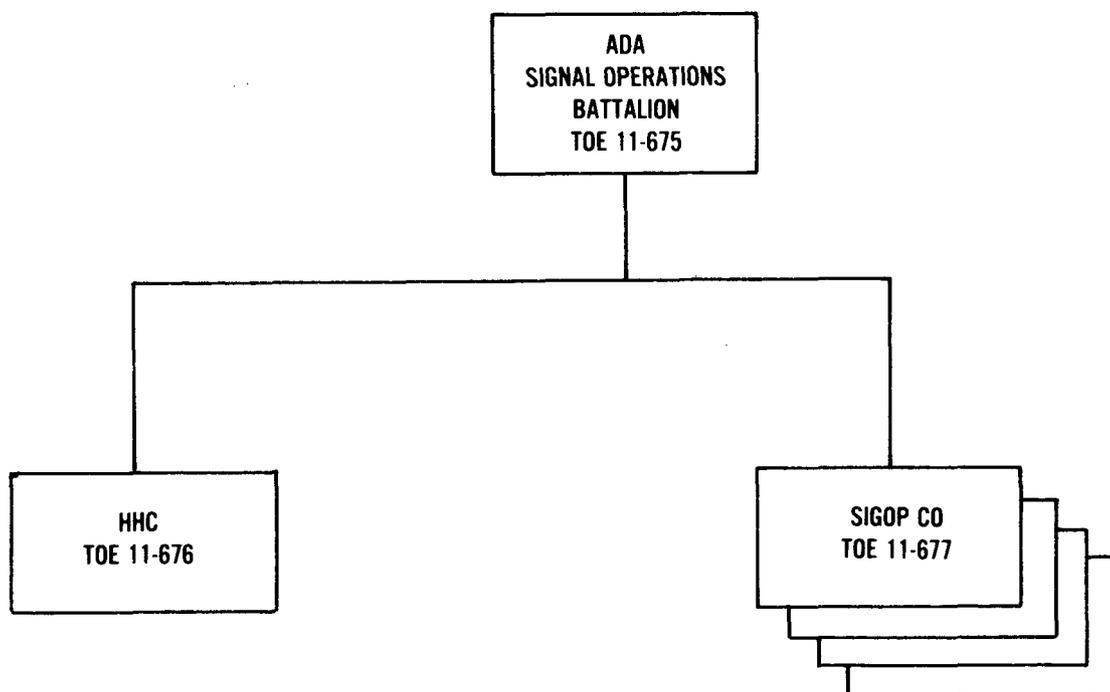


Figure 4-2. Battalion organization chart.

b. The primary mission of the AADCOM signal staff section is to perform management functions that ensure adequate communications are provided to the AADCOM commander for commanding and controlling forces. Some management functions are the assignment of blocks of frequencies, evaluation of systems performance, network layout, and long-range planning. The SIGOP section provides operational functions such as system engineering, circuit engineering, and restoration of services. The signal section advises the AADCOM commander, his staff, and his subordinate commanders on commandwide signal matters, and prepares signal estimates, plans, and orders to guide and direct subordinate commands. The section also exercises some technical supervision of signal activities within the command to ensure that communications operations are in accordance with established standards and procedures, and that communications resources and support meet requirements. To support the signal officer's advisory role, his staff monitors the status of organic communications resources in nonsignal units through command personnel and equipment reports. TCMS (formerly CEMS) functions within the command are also monitored by the signal officer and his staff by orders, reports, records, and staff visits. The AADCOM signal section is supervised by the assistant AADCOM signal officer. Personnel and their functional roles in the section are shown below.

- (1) The assistant AADCOM signal officer--
 - Receives task direction from the AADCOM signal officer.
 - Implements and supervises the subsequent operation of the section.

(2) The operations/plans officer--

- Plans for and supervises communications support for AADCOT headquarters.
- Prepares signal plans for incorporation in the AADCOT plans and orders.
- Coordinates with other headquarters staff sections regarding communications requirements.
- Handles coordination matters concerning joint force usage of the JTIDS network.
- Transfers results of these actions to the ADA brigade signal staff officer.
- Coordinates with commanders and staff on force modernization, automation, and installation of new equipment.

(3) The signal staff officer--

- Recommends the procurement, employment, and allocation of signal troops to support the command.
- Determines requirements for signal training of nonsignal troops.
- Prepares and coordinates plans and policies in maintenance of communications facilities.
- Recommends the procurement, employment, and allocation of signal supplies and equipment for nonsignal units.

(4) The frequency NCO--

- Allocates frequencies, based on evaluation of propagation and other data, to units in the brigades and battalions.
- Coordinates frequency requirements.
- Maintains records and prepares reports.
- Handles correspondence to theater headquarters on all frequency matters.

(5) The operations sergeant--

- Assists the operations/plans officer.
- Serves as the signal officer's principal enlisted assistant.
- Manages the signal office.

- Supervises and inspects all work of enlisted personnel in the section.
 - Assists the signal staff in the technical appraisal of signal operations and training.
 - Assists in the collection, preparation, and distribution of material and data pertaining to signal operations and training.
 - Assists in preparation of signal plans and orders.
- (6) The digital officer--
- Is responsible for all automation within the AADCOM.
 - Exercises staff supervision over telephone and wire digital operations throughout the AADCOM.
 - Prepares command telephone directory designation and circuit numbering schemes.
 - Assists the signal plans officer on matters pertaining to automation and modernization.
 - Prepares portions of signal plans and orders.

(7) The cryptographic materiel specialists assist the telecommunications center and cryptographic technician.

(8) The COMSEC officer serves as a cryptographic staff officer and advises the signal officer on cryptographic matters.

4-6. Battalion Staff

The staff operates under command and staff principles established in FM 101-5. All the elements of the ADA SIGOP battalion work together to support the SIGOP battalion provided communications requirements of an AADCOM. An FM voice radio net, CSPE, plus direct telephone and teletypewriter circuits, are available to engineer and control the communications mission of the battalion.

- a. The battalion commander--
- Exercises C2 through his staff by issuing orders to the operating sections of the HHC and to subordinate unit commanders.
 - Controls the technical operations of the mission communications systems through the XO and the S2/S3.
 - Ensures effective transfer of information throughout the network.
 - Makes maximum use of battalion and company SOPs.

- b. The executive officer--
 - Assists the commander.
 - Assumes command of the battalion during the commander's absence.
 - Serves as the principal action officer for electronic warfare matters.
- c. The S1 officer performs battalion administrative functions and serves as the battalion's information officer.
- d. The S2/S3--
 - Serves as both the battalion's intelligence and operations officer.
 - Advises the commander on matters involving security for the battalion headquarters and units organic to the battalion.
 - Supervises the preparation of security plans.
 - Ensures that security plans are properly implemented.
 - Is responsible for short-term operational planning.
 - Prepares operation orders, training directives, technical operation instructions, and SOPs.
 - Implements AADCOM signal plans.
 - Keeps the battalion commander informed of the signal situation.
 - Operates the CSCE facility for control of all communications systems installed and operated by the battalion.
- e. The S4 officer has staff responsibility for the battalion's logistical functions.
- f. The maintenance officer--
 - Has staff responsibility over all battalion equipment.
 - Supervises a staff of specialized maintenance assistants.
 - Keeps the battalion commander informed of equipment maintenance status.
- g. The battalion motor officer--
 - Serves as a staff officer under the battalion maintenance officer.
 - Ensures that all elements of the battalion have the automotive and generator repair parts and petroleum supplies they need.

- Maintains staff supervision over the operations of the motor maintenance facility in each company.
- h. The signal maintenance sections--
- Operate under the staff supervision of the battalion maintenance officer.
 - Provide DS level communications.
 - Provide COMSEC equipment maintenance capabilities for organic equipment of individual companies.
 - Designate personnel to man mobile repair teams based on the particular maintenance mission.
- i. The chaplain--
- Serves as a special staff officer.
 - Assists the battalion commander in making sure that all personnel of the battalion, wherever located, have the opportunity to participate in religious services and activities.
 - Assists the battalion S3 in the implementation of character guidance instructions in the training program.
- j. The command sergeant major--
- Serves as the senior enlisted representative of the battalion.
 - Performs duties as directed by the commander.
 - Advises the commander and staff on matters relative to troop welfare in terms of promotions, discipline, and privileges.
 - Serves as an experienced communicator.
 - Assists in the planning, operations, and maintenance of the communications systems established by the battalion.

4-7. Signal Battalion Operations Section

The operations section consists of the communications engineering branch, systems control branch, and the plans and training branch. This section provides all TCMS functions for the signal battalion.

a. The communications engineering branch is the CSPE for the battalion. The CSPE conducts detailed systems engineering studies and develops plans for establishing communications systems. This branch performs some specific functions such as--

- Determining the technical characteristics of circuits.

- Determining equipment suitability, adaptability, and compatibility with existing military and host nation communications systems.
- Determining the capabilities and limitations of equipment.
- Determining the types of installations and employment required to provide quality transmission over installed circuits and systems.
- Handling frequency requests and associated records for the battalion units.

Traffic status reports are analyzed continually to perfect system capabilities for handling traffic while avoiding communications traffic congestion. The results of these analyses determine the addition or deletion of circuits and facilities. The branch also maintains direct coordination with the systems control branch, keeping it informed of current and future needs for rerouting or reconstituting circuits and facilities through the command and area communications systems.

b. The systems control branch is under the operational control of the S3 which provides effective operational management and responsive system control. The main objective of the CSCE is to perfect the performance of a deployed network in the face of a constantly changing network configuration. It performs near real-time management and control of the communications network and subordinate unit's CSCEs. A data base is established and maintained to assist in near real-time control of communications systems and to assist the CSPE in systems planning and engineering. Branch responsibilities include--

- Allocating circuits based on established priorities.
- Ensuring availability of circuit routes and alternate routes by maintaining centralized control of circuits.
- Ensuring efficient service by directing the subsystem control sections of the organic units to reroute.
- Rearranging circuits to relieve traffic congestion in both the area and the command communications systems.
- Preparing and distributing priority lists.
- Preparing and distributing detailed emergency schedules.
- Coordinating restoration of circuits in the event of the disruption of communications or damage to any part of the system.
- Preparing and maintaining a systems diagram, a signal subscriber list by geographical locations, a traffic backlog status, a circuit routing diagram, accumulative circuit outage records, a priority designator list, the current status of communications systems, and a journal of daily activities.

- (1) The systems engineering officer--
 - Serves as the systems control branch chief.
 - Operates under the control of the battalion S3.
 - Analyzes all traffic status reports and studies to perfect system capabilities.
 - Determines the technical characteristics of circuits.
 - Determines equipment suitability, adaptability, and compatibility with existing military and indigenous communications systems.
 - Determines equipment capabilities and limitations.
 - Determines the overall quality of transmission facilities.
- (2) The radio systems officer--
 - Exercises staff supervision over radio communications activities.
 - Prepares SOI (formerly CEOI) items pertaining to radio communications.
 - Coordinates continually with the radio frequency officer.
 - Prepares signal plans and orders.
 - Analyzes map data.
 - Determines and establishes site locations for the LOS multichannel radio terminals and relays to ensure good paths are used.
- (3) The circuit control sergeant, tactical microwave supervisor, and telecommunications center supervisor--
 - Provide technical and field expertise to the engineering officer.
 - Coordinate with all battalion CSCEs.
 - Ensure quality, adequacy, and availability of circuits.
 - Perform day-to-day, shift-to-shift CSCE functions.
 - Coordinate, direct, and set up circuits in the area and command communications systems.
- (4) The operations sergeant--
 - Assists the branch chief and other officers.
 - Ensures the CSCE is properly staffed with enlisted personnel.

- Supervises the clerk typist and draftsman.

(5) The chief signal NCO--

- Assists the branch chief and other officers.
- Coordinates the efforts of the enlisted technical specialists.
- Supervises the draftsmen, SOI specialists, and clerical personnel.

c. The plans and training branch is responsible for planning, coordinating, and supervising the training and plans requirements of the battalion.

(1) The plans and training NCO assists in planning, in coordinating, and in staff supervision of the master plans, requirements, and training programs of the battalion.

(2) The signal operations NCO--

- Assists the plans and training officers.
- Coordinates the work of the enlisted technical specialists.
- Supervises the draftsman and clerical personnel assigned to the branch.

(3) The chemical NCO assists, the S3 officer in continuous appraisal of chemical operations and training situations.

(4) The intelligence NCO--

- Assists the S2 officer in all intelligence requirements within the brigade.
- Provides technical assistance in preparing intelligence annexes.

4-8. Operation Method

The SIGOP battalion is prepared to deploy signal communication assets to support a variety of air defense operations. The SIGOP battalion deploys three signal nodes in support of each of the four ADA brigades and the AADCOR. Establishing multiple nodes as the standard operation method--

- Increases survivability--no one critical node.
- Eases displacement of ADA units from one node to another.
- Gives greater displacement choice for ADA units.
- Allows multichannel systems to reconnect to adjacent nodes.
- Increases availability of multirouting possibilities for traffic.

- Facilitates rerouting with a circuit drop and insert capability at each node.
- Enables ADA missile maintenance units to tie in via wire and cable at the nodes and to set up reliable communications with the ADA units they support.
- Allows the ADA battalions to have greater geographical freedom in selecting tactical sites.
- Enhances alternate routing.

4-9. Tactical Displacement

The movement of the brigade headquarters or several battalions connected to a node basically establishes the need for the SIGOP battalion to reconfigure or displace its node. The TOE provides no extra equipment for a separate jump capability. The brigade CP is jumped by the redeployment of communications assets at the nodes supporting the brigade. In preparation for the move, the brigade designates one of its battalions as the master battalion. Its role is to assume brigade functions, primarily fire control, during the time the displacement is in progress. This causes the SIGOP battalion to reconfigure the affected multichannel links to home in on other nodes. Circuits are rerouted depending on the system configuration in use at the time displacement occurs. When the master battalion has the communications necessary for its mission, the brigade closes down, moves, and reestablishes at another or a new node. (In this case, the SIGOP battalion is required to phase out a node by rehomeing its users into an existing adjacent node or nodes.) After communications have been reestablished at the new location, the brigade takes control from the master battalion and the remaining affected circuits are rerouted as necessary.

4-10. Diversion

Signal units are required to furnish communications support 24 hours a day. Under certain conditions, dispersion of these units may require their efforts to be diverted from communications to provide necessary physical security for their installations. To ensure maximum use of communications, security for the units should be assumed by the troops that provide the security forces.

Chapter 5

Headquarters and Headquarters Company

5-1. General

The HHC's mission is to provide the support facilities with which the ADA signal battalion commander and staff exercise control. The HHC also installs and operates the portion of the command communications system which supports the AADCOM headquarters in a joint force theater operational role. The assignment is organic to the ADA SIGOP battalion TOE 11675.

5-2. Capabilities and Limitations

a. The HHC ADA SIGOP battalion provides at strength level 1 and 24 hours a day--

- Normal administration and logistics support for the battalion.
- Direction and coordination of battalion operations.
- Facilities with which the commander and staff exercise control of battalion functions.
- Religious services for battalion personnel.
- Mess facilities for HHC personnel.
- Organizational maintenance of vehicles, arms, and power generators organic to the HHC.
- DS level maintenance for organic signal systems equipment.

b. The HHC ADA SIGOP battalion installs and operates the nonuser-owned and -operated internal communications for the AADCOM headquarters. (This includes the communications node which supports the AADCOM headquarters.) This battalion also operates the multichannel terminals for the ADSCOM, for the reconstitution point, for the AADCOM TAC CP, and for both ends of the system which interconnect the American Patriot battalion to the host nation Patriot battalion.

c. The limitations of the HHC are the same as the battalion and are discussed in Chapter 4.

5-3. Training and Mobility

In addition to their basic skills, HHC personnel receive training under ARTEP 11-175. Company personnel train to engage in effective, coordinated defense of their respective unit's area or installation using--

- Rear area protection procedures.

- Operations in an internal defense environment.
- Defense against threat aircraft.
- Operations under NBC conditions.

5-4. Organization

a. The HHC is organized under TOE 11676. One company is allocated to the battalion. Figure 5-1 shows that the HHC provides--

- The normal battalion command and staff sections.
- The HHC section.
- A battalion level CE maintenance section.
- A signal center platoon.
- A telecommunications platoon.

b. The HHC is thus organized to supply the battalion staff, the AADCOM signal staff, a communications system installation and operation role, plus a signal DS maintenance facility.

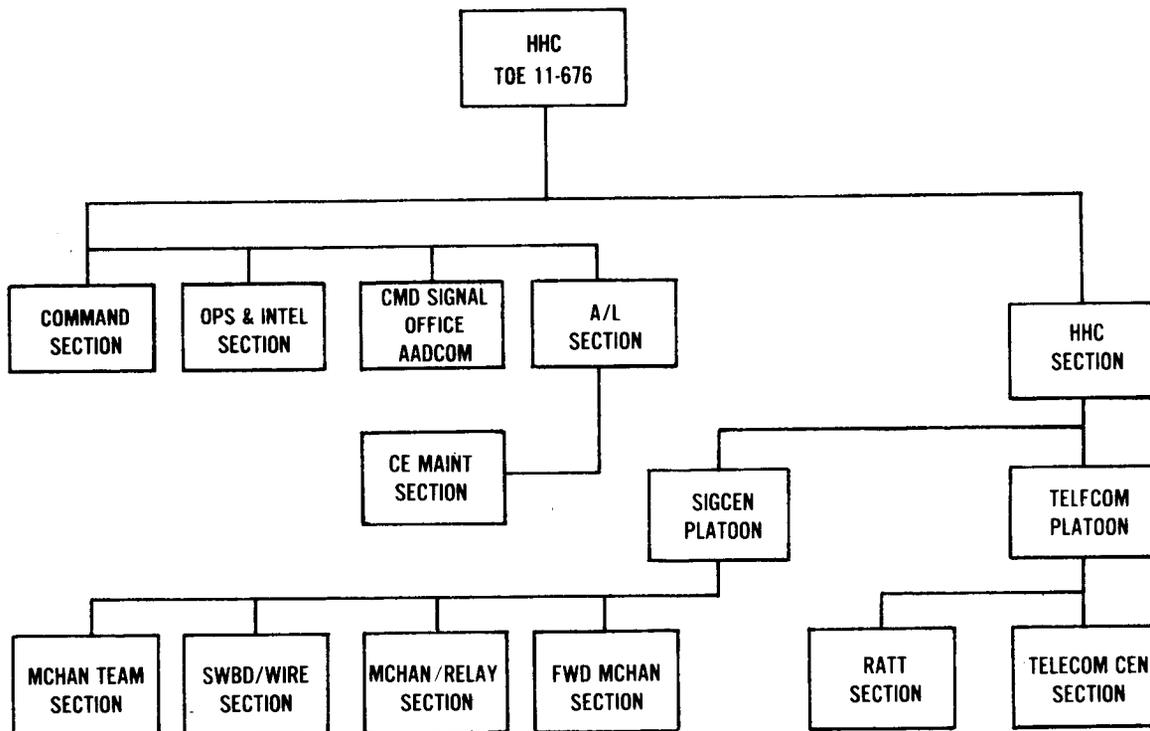


Figure 5-1. HHC organization chart.

5-5. Operation Method

The HHC operates in one location and has no augmenting equipment for jump capability. The HHC movement is handled through close out at one location and reestablishment at a new site. Communications control during this time is transferred to one of the SIGOP companies. Movement is infrequent because of its operational relationship and collocation with the AADCOP headquarters. The HHC is located near the AADCOP CP. The HHC is self-supporting and has battalion staff support functions, plus its principal communications mission. It also has two signal platoons in support of the AADCOP: the signal center platoon and the telecommunication platoon.

a. The signal center platoon sets up three communications nodes near the AADCOP headquarters CP. The main node is located in the immediate area of the CP. The node contains the automatic switch which serves the AADCOP headquarters, the patching facility, the technical control facility, and multichannel terminals for systems entering the node. Systems entering the node include the multichannel system the theater brigade furnished for communications access into the theater system. A second node is set up or deployed with the AADCOP TAC CP. A third node, a general purpose node, is set up at a greater distance from the AADCOP CP. Any of the nodes can serve as a main entry point for the multichannel systems from any of the brigades or battalions. The platoon also provides, installs, and operates the multichannel terminals at the ADSCOM, at the reconstitution point, and for the American Patriot and host nation Patriot battalion interconnection.

b. The telecommunications platoon sets up and operates the telecommunications center at the AADCOP headquarters CP. The platoon also supplies RATT terminals at the AADCOP CP for the theater command net, the theater/intelligence net, and the AADCOP command net.

Chapter 6

Brigade Signal Operations Company

6-1. General

The brigade SIGOP company's mission is to provide the nonorganic dedicated command communications system which supports ADA brigade operations. The communications system furnishes transmission of real- and near real-time digital data and voice information essential to the operational execution of air defense command control functions. The assignment is organic to the ADA SIGOP battalion TOE 11675.

6-2. Capabilities and Limitations

a. At strength level 1 and 24 hours a day, the brigade SIGOP company provides the multichannel communications system (with relay capability) between the ADA brigade and its assigned ADA battalions. It includes the lateral system between ADA brigades. The multichannel system includes telephone, teletypewriter, and data channels.

b. This company provides the command signal center for the brigade headquarters which consists of the following:

- The teletypewriter terminal facility.
- The message center, COMSEC, and facsimile.
- A local telephone distribution system.
- The RATT station for operation in the AADCOM command net and the brigade command net.
- Technical control and circuit patching facilities at each of the three nodes in the brigade area of operations.
- Unit administration, supply, and mess facilities.
- Organizational maintenance of organic vehicles and power generators.
- DS level maintenance for organic signal systems equipment.

c. The limitations of the SIGOP company are of the same constraints that apply to the whole battalion structure.

6-3. Training and Mobility

In addition to their basic skills, personnel receive training under ARTEP 11-175. Company personnel train to engage in effective, coordinated defense of their respective unit's area or installation using--

- Rear area protection procedures.
- Operations in an internal defense environment.
- Defense against threat aircraft.
- Operations under NBC conditions.

6-4. Organization

The SIGOP company is organized under TOE 11677 (Figure 6-1). Four companies are allocated to the battalion. The SIGOP company provides--

- Unit administration and supply functions.
- Mess facilities for assigned personnel.
- Organizational maintenance of organic vehicular, generator, and communications equipment.
- DS maintenance facility for its organic communications equipment.
- Internal communications equipment.
- Internal communications for the brigade headquarters. (Does not provide internal communications for ADA battalions.)

6-5. Operation Method

The SIGOP company is self-supporting and has the usual company support functions plus its principal communications mission. It has two signal platoons in support of an ADA brigade: the signal center platoon and the telecommunications platoon.

a. The signal center platoon sets up three communications nodes near the ADA brigade headquarters. The main node is located in the immediate area of the brigade CP (within cable distance). The node's automatic switch serves the brigade headquarters. The automatic switch acts as the patching facility, and as the entry point for interfacing the area signal brigade's multichannel system. The second and third nodes, general purpose nodes, are set up at greater distances from the ADA brigade CP. The nodes are geographically dispersed in the brigade area of operation providing maximum communications coverage.

b. The telecommunications platoon sets up and operates the telecommunications center at the brigade headquarters CP. The platoon also supplies the RATT terminals at the brigade CP for the AADCOM command net and the brigade command net.

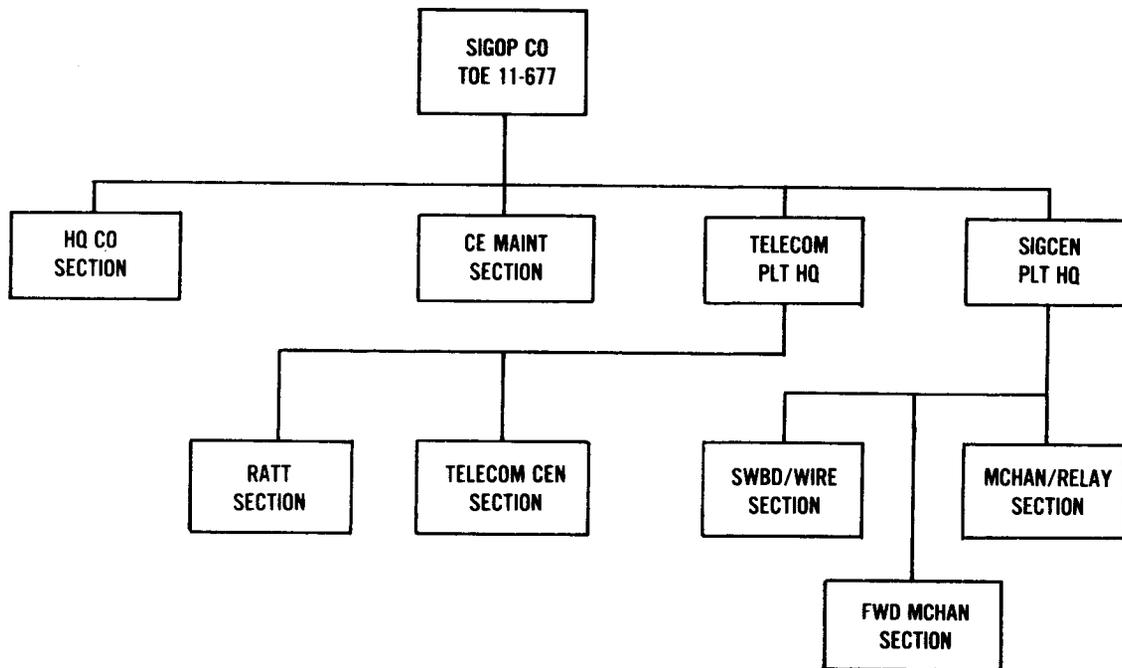


Figure 6-1. SIGOP company command structure.

Chapter 7

Signal Operations Company

7-1. General

a. The SIGOP company commander is also a signal staff officer on the staff of the supported ADA brigade.

b. The SIGOP company's mission is to provide nonuser-owned and -operated dedicated command communication systems which support an ADA light brigade. The assignment is organic to the ADA light AADCOM TOE 44422.

7-2. Capabilities and Limitations

a. The SIGOP company provides 24 hours a day--

- The secure multichannel radio communications system which provides voice and data channels to link the brigade AADCP with its assigned ADA and support battalions.

- The RATT terminals (at the light brigade CP only) for the brigade net.

- Communications and COMSEC equipment DS maintenance for the SIGOP company and also for the ADA battalions, until area signal maintenance support arrives and assumes its support mission.

b. The SIGOP company depends on--

- Combat service support organizations for medical, dental, and financial services.

- The Air Force for tactical airlift support.

- The TCC(A) for radio frequency allocations.

- The area signal network for communications entry into the area system.

- The theater transportation command for personnel and equipment movements.

- The ADA brigade HHC for mess facilities.

- The ADA brigade for religious services.

- The ADA brigade for petroleum.

- Combat support organizations for extended term DS/GS maintenance support.

7-3. Training and Mobility

In addition to their basic skills, SIGOP company personnel receive further training under ARTEP 11-175. Personnel train to engage in effective, coordinated defense of their respective unit area or installation using--

- Rear area protection procedures.
- Operations in an internal defense environment.
- Defense against threat aircraft.
- Operations under NBC conditions.

7-4. Organization

The SIGOP company is organized under TOE 11678. One company is assigned to the ADA brigade. Figure 7-1 shows the organization chart of the SIGOP command structure.

- a. The headquarters company section operates as the command, control, and coordinating element for all unit operations and training. It provides personnel and equipment for unit administration and supply functions, and organizational maintenance of organic equipment. No messing facilities are provided. The company messes with the AADCOM HHC since the company collocates with the brigade.
- b. The CE maintenance section operates under the supervision of the commander. It provides DS level maintenance of communications equipment organic to the SIGOP company. It also provides DS support for the light AADCOM units during deployment (only until the area signal support arrives and assumes its normal responsibility).
- c. The radio/wire platoon has two sections which provide teletype service for the brigade net and switchboard wire service.
- d. The multichannel/relay platoon has two sections which provide the command communication links for voice and data among the brigade headquarters, CRC, TAOC, and the ADA battalions.

7-5. Operation Method

- a. The light AADCOM is configured with five battalions. The headquarters AADCP is located near an Air Force CRC. Each ADA battalion can function under operational control of a TAOC when unable to be linked to the AADCP. The battalions deploy throughout the area of operations to protect high priority assets. The SIGOP company provides the dedicated communications systems at each of these locations.

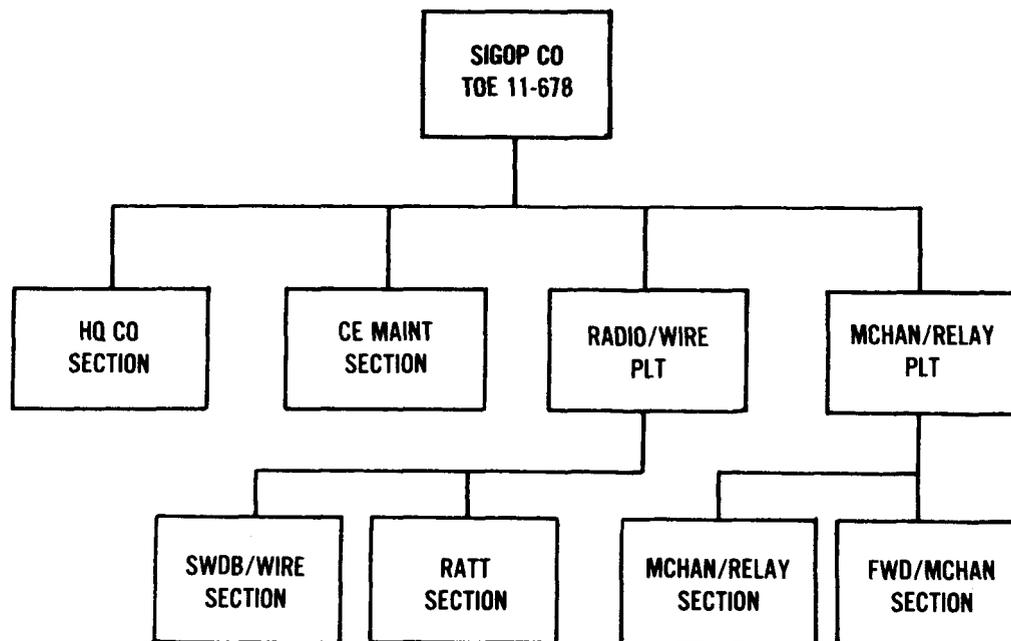


Figure 7-1. SIGOP command structure.

b. The SIGOP company must supply communications to support whatever ADA structure and geographical dispersions are required.

(1) Figure 7-2 shows the ADA brigade linked to each of its battalions and operating with one deployed CRC. The figure shows the system linkage required for C2. In this figure, the SIGOP company sets up a communications node in the immediate area of the ADA brigade CP. Multichannel systems, with relays as needed, are set up to link the CRC and each of the battalions. HF radios provide voice backup for the ICN circuits. FM radios provide secure voice for participation in the brigade command net.

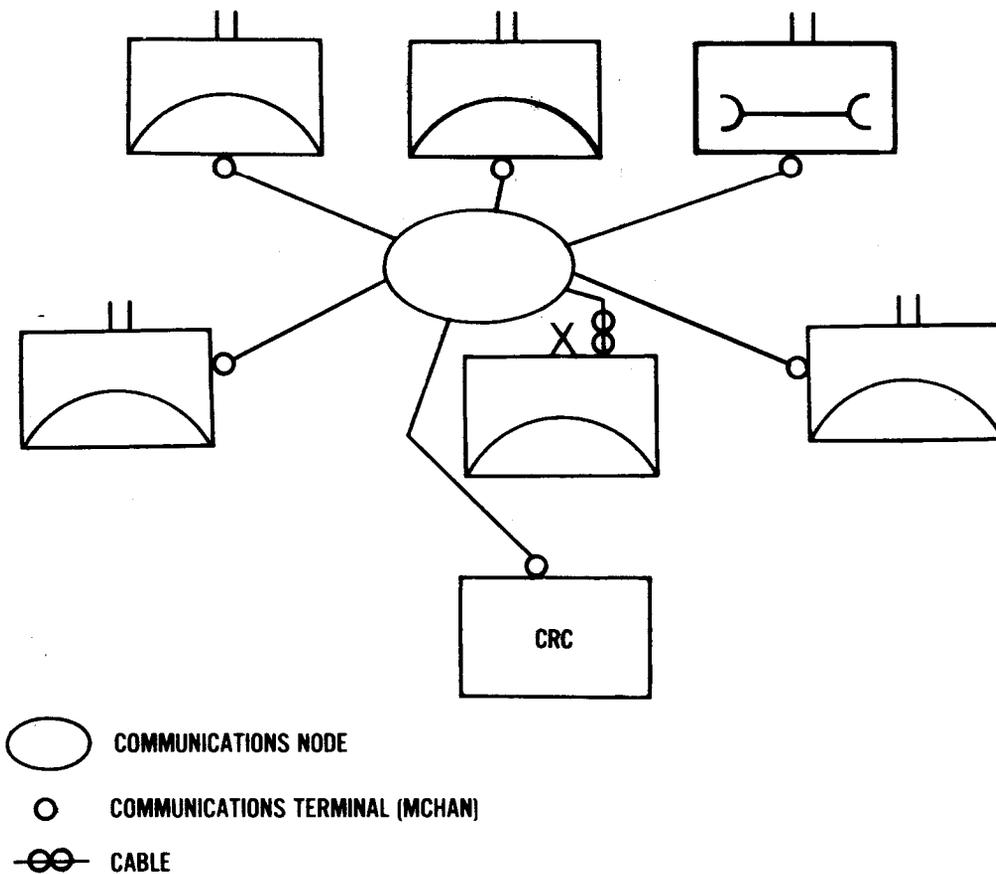


Figure 7-2. System linkage required for C2.

(2) Figure 7-3 shows a scenario where multichannel links cannot be established to all battalions because of distance or terrain problems. It also involves a joint force operation where the Air Force CRC and a Marine Corps TAOC are employed. Only three of the battalions can be linked via multichannel to the brigade. The other two link individually, via multichannel, to the TAOC.

This causes changes in fire direction operational control relationships and equipment employment. Since the ADL circuit can only be carried on multichannel, these two battalions come under operational control of the respective TAOC. The command relationship, however, is retained from the brigade using RATT as the initial communications means. (As the area signal brigade subsequently installs area communications, common-user telephone service becomes available for additional communications.)

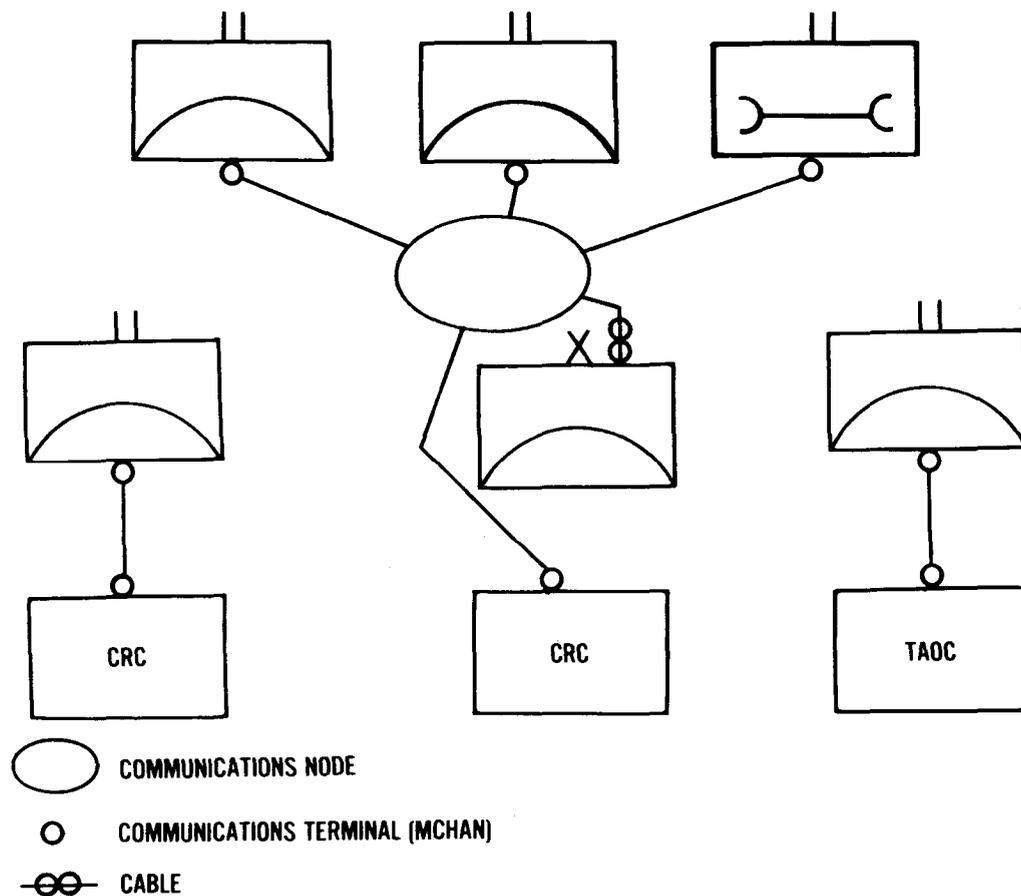


Figure 7-3. ADA brigade multichannel net.

Chapter 8

Signal Operations Communications Modernization

8-1. General

a. The Signal School and the Air Defense School have developed an architecture to modernize the communications support of air defense forces. This will affect the allocation of equipment and the way users communicate in the force structure. As new equipment is brought into service, the ADA SIGOP battalion and its companies will undergo change. (See Figure 8-1.) The SIGOP battalion will transition into an architecture called TRI-TAC Block III, which will enhance the connectivity to ADA forces. The TRI-TAC Block III also enhances the common-user area network with a decreasing dependence on dedicated communications support. (See Figures 8-2 and 8-3.) This chapter describes the changes and the basic advantages. The communications concepts are changing in several ways towards--

- More user-owned and -operated equipment.
- Conversion to digital telecommunication systems technology.
- Use of infrastructure landline communications systems.
- Automation of communications facilities through embedded processors in various equipment.
- Flood search routing, automatic subscriber affiliation, and fixed directory numbering plans.
- MSRT capability.
- Complete compatibility and functional equivalency with corps/division.

b. The Army's modernization program introduces advanced technology to enable more robust communications. Specific enhancements are as follows:

- Full use of encryption to deny intelligence gathering from communications monitoring.
- Commonality of equipment on the battlefield to make discrimination of nodes based on signals intelligence difficult.
- Frequency hopping to reduce signature, therefore making monitoring, jamming, and DF difficult.
- Highly directional antennas and automatic adjustment of power output to improve ECCM operation.

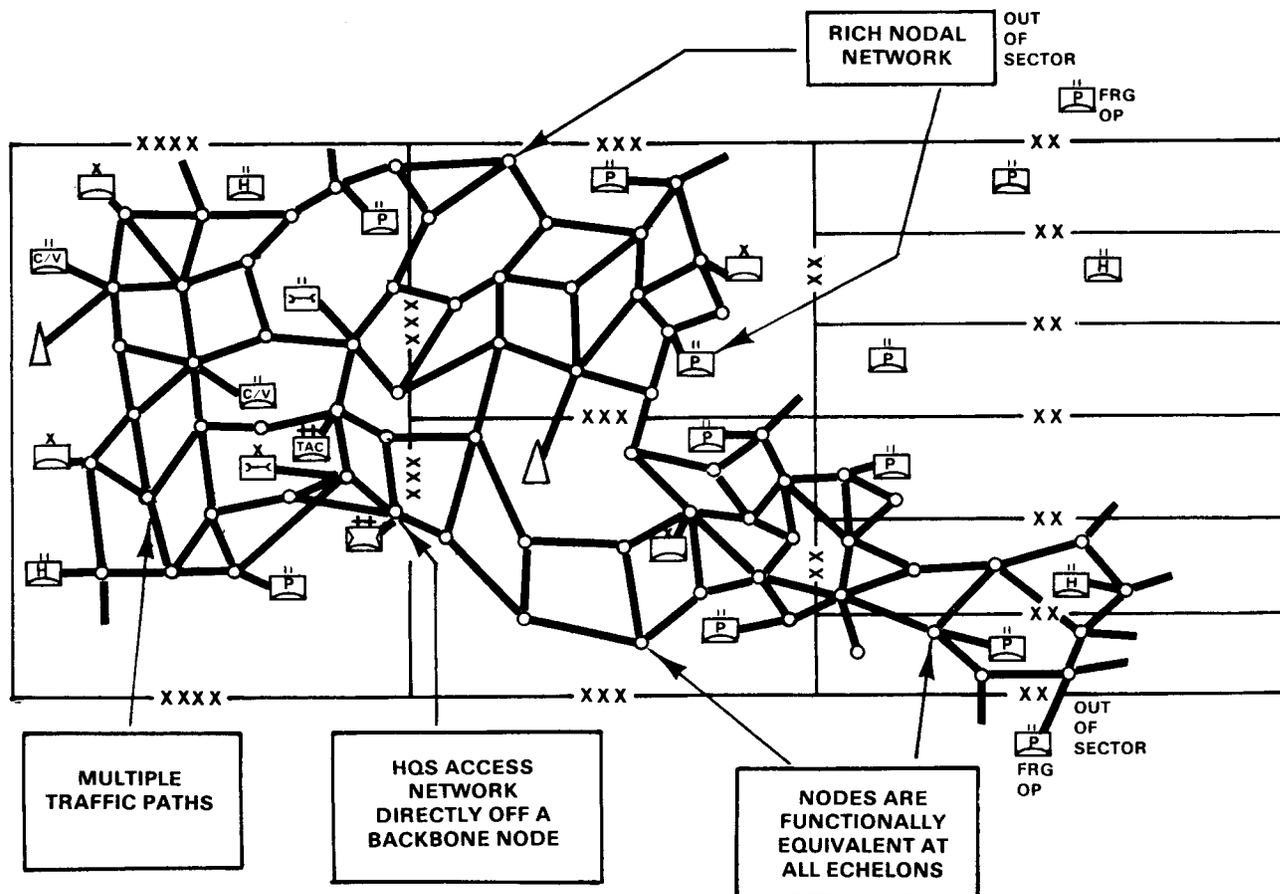


Figure 8-3. Representative deployment.

8-2. Modernization Changes

a. The automated HIMAD FDC communications interface design prevents the single-channel encryption and low rate multiplexing necessary for communications of ADL and voice circuits over landlines. The LACE terminal interfaces the automated FDC to the landline permitting the use of host country telephone systems, European telephone systems, and the NATO Integrated Secure Digital Network, when available.

b. The manual patch panels and switchboards will be replaced by automatic digital switches. These switches combine both functions into one unit. Patching is accomplished through software control which causes the appropriate electrical circuits to be set up. Digital operation will enable tactical telephone users to complete calls by push-button dialing. Calls will be automatically routed throughout both the ADA network and external area networks via flood search routing compatible to corps and division MSE. A number of automated user assistance/convenience features also become available as a built-in by product inherent in using digital switching technology.

c. The MSRT will provide discrete accessibility to the switched common user system via radio linkage giving new meaning to battlefield mobility. The radio operates in a full duplex mode with high and low frequency band containing transmit and receive channels.

d. Digital phones will be introduced along with the switches. Appropriate users will have secure digital phones. In those cases where analog instruments/devices will be retained, the terminals to which they are connected will make use of built-in or ancillary analog to digital converters. Rapidly completed calls, automatically routed through high quality switches without circuit loss, will greatly facilitate C2 transactions.

e. The PCM multiplex equipment will be replaced with digital equipment. All links will be encrypted from switch to switch. With an all digital system, this need is more readily achieved and the benefits of greatly reduced traffic analysis on the part of the Threat will be realized.

f. Fiber optic cable systems will be introduced for down-the-hill linkage of radios to the switches. With this technology, the radio's entire baseband output can be placed on one cable which is secure from the usual means of electromagnetic signal intercept. The radios can be placed a substantial distance from the CP or main communications node thus reducing the probability of revealing the main site through DF or signature analysis or by identification of antennas. This will provide a remoting capability of meaningful distance, virtually secure, and without complex equipment needs.

g. The RATT terminals will be replaced by user-owned and -operated microprocessor based terminals for formal and informal message traffic origination and handling. Traffic will be sent from terminal to terminal on a dial-up basis using telephone circuits. FM and I-IF radios may also be equipped with data modems which will enable digital data transmission between terminals. Elimination of RATT terminals will result in substantial personnel savings and will eliminate technologically obsolete, complex, and unreliable equipment.

(1) Digital facsimile terminals, organic to users down to battalion level, will provide high-speed transmission of informal page copy and graphics or sketch type material.

(2) SDNRI available at each signal node will provide combat net radio users access to the digital switched telephone network. This will provide users a secure mobile radio telephone facility.

Glossary

Abbreviations and Acronyms

A2C2	Army airspace command and control
AADC	Area Air Defense Commander
AADCOM	Army Air Defense Command
AADCP	Army Air Defense Command Post
ADA	air defense artillery
adj	adjacent
ADL	automatic data link
ADSCOM	air defense support command
A/L	administrative logistic
AMG	antenna mast group
AR	Army regulation
ARTEP	Army Training and Evaluation Program
attn	attention
bn	battalion
C2	command and control
CAME	corps airspace management element
CE	communications-electronics
CEMS	communications-electronics management system (see TCMS)
cen	center
CEOI	Communications-Electronics Operation Instructions (see SOI)
CESI	Communications-Electronics Standing Instruction (see SSI)
cmd	command
co	company
COMSEC	communications security
CONUS	continental United States
CP	command post
CRC	control reporting center
CSCE	communications systems control element
CSPE	communications system planning element
Cv	Chaparral/Vulcan
d	degrees
DF	direction finding
DS	direct support
E2C	Navy AWACS
E3A	NATO AWACS
EAC	echelons above corps
ECCM	electronic counter-countermeasures
ECM	electronic countermeasures
ECS	engagement control station
EPP	electrical power plant
ESM	electronic warfare support measures
F	Fahrenheit
FAAD C2I	Forward Area Air Defense Command, Control, and Intelligence
FDC	fire direction center

FLOT	forward line of own troops
FM	frequency modulated; when used with a number FM means field manual
FRG	Federal Republic of Germany
fwd	forward
G3	Assistant Chief of Staff, G3 (Operations and Plans)
GS	general support
H	hawk
HF	high frequency
HHB	headquarters and headquarters battery
HHC	headquarters and headquarters company
HIMAD	high-to-medium-altitude air defense
HIPIR	high-power illuminator radar
HQ	headquarters
ICC	information and coordination central
ICN	interface coordination net
IFF	identification, friend or foe (radar)
intel	intelligence
JTIDS	Joint Tactical Information Distribution System
LACE	Landline Air Defense Communications Encryption
LOS	line of sight
maint	maintenance
mchan	multichannel
mgt	management
mm	millimeter
MSE	mobile subscriber equipment
MSRT	mobile subscriber radio telephone
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NCO	noncommissioned officer
NCS	net control station
NICS	NATO Integrated Communications Systems
NRI	net radio interface
op	operated
OPCOM	operational command
OPCON	operational control
ops	operations
P	patriot
PCM	pulse code modulation
PCP	platoon command post
plt	platoon
RATT	radio teletypewriter
RAU	radio access unit
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SDNRI	secure digital net radio interface
SEN	small extension node
SHORAD	short-range air defense
sig	signal
SIGCEN	signal center

SIGOP	signal operations
SIS	special information systems
SOI	Signal Operation Instructions (formerly CEOI)
SOP	standing operating procedure
spt	support
SSI	Signal Standing Instruction (formerly CESI)
SUPP	supplement
sw	switch(ing)
swbd	switchboard
TA	theater Army
TAADCOM	Theater Army Air Defense Command
TAC	Tactical Air Command
TAC CP	tactical command post
TAOC	tactical air operations center
TAS	tracking adjunct system
TCC	Theater Communications Command
TCC(A)	Theater Communications Command (Army)
TCMS	Tactical Communications Management System (formerly CEMS)
telecom	telecommunications
TOC	tactical operations center
TOE	table(s) of organization and equipment
TRADOC	United States Army Training and Doctrine Command
TRI-TAC	Tri-Service Tactical Communications
UHF	ultra high frequency
us	United States (of America)
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
VHF	very high frequency
XO	executive officer

References

Required Publications

Required publications are sources which users must read in order to understand or to comply with this publication.

Army Regulations (AR)

190-13 220-1	The Army Physical Security Program Unit Status Reporting
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Field Manuals (FM)

24-1 44-1-2 100-5 101-5	Combat Communications Air Defense Artillery Reference Handbook Operations Staff Organization and Operations
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Related Publications

Related publications are sources of additional information. Users do not have to read them to understand this publication.

Allied Communications Publications (ACP)

100 (US SUPP-1)	(C) U.S. Call Sign and Address Group System Instructions and Assignments (U)
110	Tactical Call Sign Book (U)
117	(R) Allied Routing Indicator Book (U)
117 (US SUPP-1)	Allied Routing Indicator Book (U)
117 (US SUPP-2)	Routing Indicator Book for Mobile Commands and Units (U)
117 (US SUPP-3)	Defense Communications System Routing Doctrine General Purpose Networks (U)
117 (US SUPP-4)	(C) US Special Purpose Routing Indicator Book (U)
117 (US SUPP-5)	CONUS Military TWX/Telex Directory (U)
117 (CAN-US SUPP-1)	Allied Routing Indicator Book--Canada--United States (U)
121 (US SUPP-1)	(C) Communication Instructions--General (U)
121 (NATO SUPP-1)	(R) Communication Instructions General NATO Basegram System (U)
124	(C) Communication Instructions--Radiotelegraph Procedures (U)
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126	(R) Communication Instructions--Teletypewriter (Teleprinter) Procedures (U)
127	Communication Instructions--Tape Relay Procedures

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66-5	Armed Forces Courier Service
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70-61	Type Classification of Army Materiel
105-3	Reporting Meaconing, Intrusion, Jamming and Interference of Electromagnetic Systems
105-10	Communications Economy and Discipline
105-86	Performing Electronic Countermeasures in the United States and Canada
340-15	Preparing and Managing Correspondence
350-1	Army Training
380-5	Department of the Army Information Security Program
380-40	(C) Policy for Safeguarding and Controlling COMSEC Information (U)
380-83	Civil Censorship
380-200	Armed Forces Censorship
380-235	Enemy Prisoner of War and Civilian Internee Communications Censorship
381-14	(S) Technical Surveillance Countermeasures (TSCM) (U)
525-22	(S) Electronic Warfare (EW) Policy (U)
530-1	Operations Security (OPSEC)
530-2	Communications Security
530-3	(C) Electronic Security (U)
530-4	(C) Control of Compromising Emanations (U)
600-83	The New Manning System - Cohort Unit Replacement System
604-5	Personnel Security Program
640-15	Criteria for Insuring the Competency of Personnel to Install, Maintain and Repair Communications Security Equipment
700-138	Army Logistics Readiness and Sustainability
710-2	Supply Policy Below the Wholesale Level
750-1	Army Materiel Maintenance Policies

Army Training and Evaluation Programs (ARTEP)

11-175	Air Defense Artillery Signal Operations Battalion
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DA Forms

2028 Recommended Changes to Publications and Blank Forms

Department of the Army Pamphlets (DA Pam)

25-30 Consolidated Index of Army Publications and Blank Forms
 310-35 Index of International Standardization Agreements
 738-750 The Army Maintenance Management System (TAMMS)

Field Manuals (FM)

1-103 Airspace Management and Army Air Traffic in a Combat Zone
 1-111 Aviation Brigade
 1-112 Attack Helicopter Battalion
 3-3 NBC Contamination Avoidance
 5-100 Engineer Combat Operations
 6-20 Fire Support in Combined Arms Operations
 6-20-2(HTF) Division Artillery, Field Artillery Brigade, and Field Artillery Section (Corps) (How To Fight)
 7-7 The Mechanized Infantry Platoon and Squad (APC)
 7-10(HTF) The Infantry Rifle Company (Infantry, Airborne, Air Assault, Ranger)
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 17-95 Cavalry Operations
 21-60 Visual Signals
 23-30 Grenades and Pyrotechnic Signals
 24-2 Radio Frequency Management
 24-16 Communications-Electronics Operations, Orders, Records and Reports
 24-17 Tactical Communications Center Operations

24-18	Tactical Single-Channel Radio Communications Techniques
24-20	Tactical Wire and Cable Techniques
24-21	Tactical Multichannel Radio Communications Techniques
24-22	Communications-Electronics Management System (CEMS)
24-33	Communications Techniques: Electronic Counter-Countermeasures
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34-62	Counter-Signals Intelligence (C-SIGINT) Operations
44-1	US Army Air Defense Artillery Employment
44-1A	(S) Air Defense Artillery Operational Planning Data (U)
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44-3	Air Defense Artillery Employment: Chaparral/Vulcan/Stinger
44-4	Operations and Training, Chaparral
44-5	Operations and Training, Vulcan
44-8	Small Unit Self-Defense Against Air Attack
44-15	Patriot Battalion Operations (How To Fight)
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44-18-1	Stinger Team Operations
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44-23(HTF)	US Army Air Defense Artillery Employment, Redeye (How To Fight)
44-61	Procedures and Drill for Twin 40-mm, Self-Propelled Gun, M42 and M42A1
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71-3(HTF)	Armored and Mechanized Brigade Operations (How To Fight)
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90-10(HTF)	Military Operations on Urbanized Terrain (MOUT) (How To Fight)
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90-14	Rear Battle
100-2-1	Soviet Army Operations and Tactics
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101-5-1	Operational Terms and Symbols

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2	(0) Unified Action Armed Forces (UNAAF)
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10	(C) Tactical Command and Control Communications Systems Standards (U)
12, Vol 1	(0) Tactical Command and Control Planning Guidance and Procedures for Joint Operations (Information Exchange Planning Guide)
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Standardization Agreements (STANAG)

4175	Multifunctional Information Distribution System (MIDS)
4202	Transmission Envelope Characteristics for High Reliability Data Exchange Between Land Tactical Data Processing Equipment Over Single Channel Radio Links

4203	Technical Standards for Single Channel HF Radio Equipment
4204	Technical Standards for Single Channel VHF Radio Equipment
4205	Technical Standards for Single Channel UHF Radio Equipment
4206	The NATO Multichannel Tactical Digital Gateway - System Standards
4212	The NATO Multichannel Tactical Digital Gateway - Radio Relay Link Standards
4245	Secure and ECM Resistant HF Low Speed Digital Data Communications System
4246	Have Quick and UHF Secure Jam Resistant Communications Equipment
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5040	NATO Automatic and Semi-Automatic Interfaces Between the National Switched Telecommunications Systems of the Combat Zone and Between these Systems and the NATO Integrated Communications System (NICS) Period from 1979 to the 1990s

Table(s) of Organization and Equipment (TOE)

11675	Signal Operations Battalion (TAADCOM)
11676	HHC ADA Signal Battalion
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11678	Signal Operations Company (RDF ADA Brigade)
44422	HCB ADA Brigade, Light Corps
44601	HCB, AADCOM (TA)

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11-6	Grounding Techniques
24-18	Communications in a 'Come As You Are' War
44-5-1	Vulcan (SP) Combat Operations

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9-1005-286-10	Operator's Manual (Crew) for Gun, Air Defense Artillery, Towed, 20-MM, M167A1
9-1005-286-20-1	Organizational Maintenance Manual for Gun, Air Defense Artillery, Towed: 20-mm, M167A1; Cannon M168; Carriage M42A1; Sight M61 and Radar AN/VPS-2
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9-1300-206	Ammunition and Explosives Standards
9-1400-425-12	Operator and Organizational Maintenance Manual: Intercept-Aerial, Guided Missile System M41 and Training Intercept-Aerial, Guided Missile System M46A1 and M46A2 (Redeye Air Defense Guided Missile System)
9-1425-429-12	Operator's and Organizational Maintenance" Manual for Intercept-Aerial, Guided Missile System; Trainer, Handling, Guided Missile Launcher, M60; Interrogator Set, AN/PPX-3; Interrogator Set Programmer, AN/GSX-1 and Transport Harness (Stinger Air Defense Guided Missile System)
9-2300-257-20	Organizational Maintenance Manual: Carrier, Personnel, Full Tracked, Armored: M113A1 and M113A2 Carrier, Command Post, Light, Tracked: M577A1 and M577A2; Carrier, Mortar, 107-mm, Self-Propelled: M106A1 and M106A2 and 81-mm, Self-Propelled: M125A1 and M125A2; Carrier, Flame Thrower, Self-Propelled: M132A1; Chassis, Gun, Antiaircraft Artillery, 20-mm, Self-Propelled, M741 and Recovery Vehicle, Light, Armored: XM806E1
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11-666	Antennas and Radio Propagation

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Command publications cannot be obtained through Armywide resupply channels. Determine availability by contacting the address shown. Field circulars expire three years from the date of publication, unless sooner rescinded.

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44-32	Echelons Above Corps Air Defense Artillery Operations. March 1986. Commandant, US Army Air Defense Artillery School, ATTN: ATSA-DTM-MB, Fort Bliss, Texas 79916-7090.
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Journal of Electronic Defense
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FM 11-44
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